1          1.         A remote copy system, comprising:

2                     a first storage system including a first storage controller and a first data

3     volume, the first storage controller being configured to control data access requests to the

4     first data volume, the first storage system being configured to store write data in the first data

5     volume upon receiving a write request from a first host associated with the first storage

6     system and generate a journal including control data and journal data;

7                     a second storage system including a journal volume and configured to receive

8     and store the journal generated by the first storage system in the journal volume; and

9                     a third storage system including a second data volume and configured to

10    receive the journal from the second storage system and store the journal data of the journal to

11    the second storage system according to information provided in the control data.


1          2.         The remote copy system of claim 1, wherein the first storage system

2     transmits the journal to the second storage system synchronously with the write request

3     received from the first host, and the second storage system transmits the journal to the third

4     storage system asynchronously with the write request received from the first host.


1          3.         The remote copy system of claim 1, wherein the second storage system

2     is located relatively close to the first storage system and the third storage system is located

3     relatively far from the first storage system.


1          4.         The remote copy system of claim 3, wherein the second storage system

2     is located within 100 miles of the first storage system and the third storage system is located

3     more than 100 miles from the first storage system.


1          5.         The remote copy system of claim 1, wherein the journal volume is a

2     first-in-first-out memory.


1          6.         The remote copy system of claim 1, wherein the journal volume

2     includes a control data area and a journal data area, the control data area being configured to

3     store only control data and the journal data area being configured to store only journal data.


1          7.         The remote copy system of claim 1, further comprising:

2          a second host coupled to the third storage system, wherein the second storage

3    system is configured to function as a primary storage system if the first storage system

4    experiences failure.

1         8.     The remote copy system of claim 1, wherein the first storage system

2    transmits the journal to the second storage system synchronously with the write request

3    received from the first host, and the second storage system transmits the journal to the third

4    storage system asynchronously with the write request received from the first host, the second

5    storage system further comprising:

6         a sequence information attaching unit that is configured to attach sequence

7    information to the journal received from the first storage system.

1         9.     The remote copy system of claim 8, wherein the sequence information

2    attaching unit includes a counter to attach information on the order of receipt on a control

3    data of a journal received by the second storage system.

1         10.    The remote copy system of claim 9, the sequence information

2    attaching unit further including a timestamp to attach information on the time of receipt on

3    the control data of the journal received by the second storage system.

1         11.    The remote copy system of claim 1, further comprising:

2         a second host coupled to the second storage system; and

3         a third host coupled to the third storage system,

4         wherein data mirroring is maintained between the first data volume an the

5    second data storage volume.

1         12.    The remote copy system of claim 11, wherein the third storage system

2    is configured to replace the first storage system as a primary storage system if the first storage

3    system experiences failure.

1         13.    The remote copy system of claim 11, wherein the second storage

2    system includes a third data volume that is configured to mirror the first data volume, where

3    the second storage system is configured to function as a primary storage system in place of

4    the first storage system if the first storage system experiences failure.

1         14.    A storage system, comprising:

2           a first storage controller to receive data access requests from a first host;

3           a first storage area that is associated with the first storage controller and

4     configured to store information according to controls of the first storage controller, the first

5     storage area including a primary volume,

6           a second storage controller provided at least 100 miles away from the first

7     storage controller; and

8           a second storage area that is associated the second storage controller and

9     configured to store information according to the controls of the second storage controller, the

10    second storage area including a secondary volume,

11          wherein the secondary volume mirrors the primary volume,

12          wherein the first storage controller is configured to store write data associated

13    with a write request from the first host in the primary volume and generate a journal

14    including control data and journal data in response to the write request, the journal data

15    corresponding to the write data, the journal being transmitted synchronously to an journal

16    volume provided external to the first storage area.

1           15.     A method for operating a remote copy system, the method comprising:

2           generating a journal including control data and journal data at a primary

3     storage system after receiving a write request from a primary host associated with the primary

4     storage system; and

5           transmitting the journal to an intermediary storage system for data mirroring

6     between the primary storage system and a secondary storage system, the secondary storage

7     system being remotely located from the intermediary storage system.

1           16.     The method of claim 15, further comprising:

2           transmitting the journal from the intermediary storage system to the secondary

3     storage system, wherein the journal is transmitted in a synchronous mode from the primary

4     storage system to the intermediary storage system and in an asynchronous mode from the

5     intermediary storage system to the secondary storage system.

1           17.     The method of claim 15, further comprising:

2           indicating that the write request has been completed by the primary storage

3     system upon receiving an acknowledgement of receipt of the journal from the intermediary

4     storage system,

5               wherein the intermediary storage system is located within 100 miles of the
6    primary storage system and the secondary storage system is located more than 100 miles
7    away from the primary storage system.

1            18.    The method of claim 15, further comprising:
2            storing the journal in a journal volume of the intermediary storage system.

1            19.    The method of claim 18, further comprising:
2            storing the journal data in a storage volume of the intermediary storage system
3    to mirror the primary volume.

1            20.    The method of claim 18, further comprising:
2            attaching sequence information to the control data of the journal, wherein the
3    secondary storage system stores the journal data in the secondary volume according to
4    information provided in the control data.

1            21.    The method of claim 15, further comprising:
2            substituting the secondary storage system as a new primary storage system if
3    the primary storage system experiences failure.

1            22.    The method of claim 15, further comprising:
2            providing the intermediary storage system as a new primary storage system if
3    the primary storage system experiences failure.